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REMARKS

The application has been reviewed in light of the Office Action dated December 16, 2003.

Claims 1-5, 9-13 and 15-20 are pending in this application, with claims 1, 9 and 15 being in independent form. Claims 6-8 and 14 were previously canceled without prejudice or disclaimer. By the present Amendment, claims 1, 9, 15 and 18 have been amended to place the claims in better form for examination and to clarify the claimed invention. It is respectfully submitted that no new matter and no new issues have been introduced.

The Office Action states that the specification is objected to as having informalities. More specifically, the Office Action states that the specification should be amended to reflect the changes to the drawings.

By this Amendment, the specification has been appropriately amended.

Accordingly, withdrawal of the objection to the specification is requested.

Claims 1-3, 9, 10, 12, 15-18 and 20 were rejected under 35 U.S.C. §103(a) as purportedly unpatentable over U.S. Patent No. 6,323,490 to Ikeda et al. in view of U.S. Patent No. 6,163,029 to Yamada et al. Claims 4 and 5 were rejected under 35 U.S.C. §103(a) as purportedly unpatentable over Ikeda and Yamada in view of U.S. Patent No. 6,330,303 to Yamane et al. Claims 11, 13, and 19 were rejected under 35 U.S.C. §103(a) as purportedly unpatentable over Ikeda and Yamada in view of U.S. Patent No. 5,379,336 to Kramer et al.

Applicants have carefully considered the Examiner's comments and the cited art, and respectfully submit that independent claims 1, 9 and 15, as amended, are patentable over the cited art, for at least the following reasons.

This application relates to control of signal-to-noise ratio in digital imaging systems so that the system can operate appropriately for a wide range of applications and energy levels.

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As discussed in the Background section of the application, for many objects to be imaged, high radiation exposures are used so that low contrast details can be differentiated. These applications of the imaging system have respective, but widely varying, signal-to-noise requirements. Conventional imaging systems are typically optimized for one application or a few applications having similar signal-to-noise requirements, and are not suitable for a wide range of applications having diverging signal-to-noise requirements.

Applicants devised a digital imaging device which can operate appropriately for a wide range of applications, and has a signal-to-noise behavior which can be suitably controlled to attain an appropriate signal-to-noise ratio for a selected object being imaged with the device.

The digital imaging device includes a top electrode layer, a dielectric layer under the top electrode layer, a sensor layer under the dielectric layer (the sensor layer including a photoconductive layer and a plurality of pixels, and each pixel including a charge-collecting electrode), a thin film transistor readout matrix connected to the charge-collecting electrodes, and a variable power supply.

Applicants have amended claim 1 to clarify that the variable power supply includes a programmable controller, wherein the variable power supply under programmed control of the programmable controller provides voltages corresponding to signal-to-noise ratios in a suitable range, and the programmable controller controls the variable power supply to provide a selected voltage suitable for attaining a desired signal-to-noise ratio for a selected object being imaged with said digital imaging device.

Applicants simply do not find a teaching or suggestion in the cited art of such features.

Ikeda, as understood by Applicants, is directed to an X-ray semiconductor detector suitable for a medical X-ray diagnostic apparatus. Ikeda is concerned with preventing

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characteristic errors and dielectric breakdown of a protective diode, caused by X-ray, in an X-ray semiconductor detector, in order to protect a signal read (TFT) transistor from dielectric breakdown, while allowing for increase in pixel density.

Fig. 3 of Ikeda shows a programmable voltage generator. However, the Office Action acknowledges that Ikeda does not disclose or suggest any particular criteria for controlling the voltage out of the voltage generator.

Yamada, as understood by Applicants, is directed to an X-ray detector for an X-ray diagnosing apparatus which includes means for varying a gain of the detector according to X-ray irradiation condition (i.e. X-ray amount--see Yamada, column 2, lines 10-13).

However, Applicants do not find a teaching or suggestion in Ikeda of including in the apparatus of Yamada a variable power supply and a programmable controller, wherein the variable power supply under programmed control of the programmable controller provides voltages corresponding to signal-to-noise ratios in a suitable range, and the programmable controller controls the variable power supply to provide a selected voltage suitable for attaining a desired signal-to-noise ratio for a selected object being imaged with said digital imaging device, as described in claim 1 as amended.

The Office Action contends that Yamada at column 14, line 64 to column 15, line 21 discloses varying the bias voltage to allow for detection of a minute change of contrast, and that Yamada thereby purportedly suggests the desirability of varying the voltage of the power in order to control the signal-to-noise ratio. Applicants respectfully disagree.

Yamada, at column 14, line 64 to column 15, line 21, states as follows:

"As a result, the bias voltage of the X-ray solid flat panel detector 37 is set to an appropriate gain depending on the X-ray irradiation condition. Therefore, it comes that a signal input to the ADC 65 is capable of effectively using a dynamic range of the ADC."

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65, intensifying density resolution on the X-ray image and reading a minute change of contrast."

Accordingly, it is abundantly clear from reading the quoted portion of Yamada, as well as other portions of Yamada is concerned with increasing gain, and not with controlling signal-to-noise ratio suitably according to the object being imaged.

In addition, it should be noted that although changing the signal-to-noise ratio can affect contrast in the image, a statement of "reading a minute change of contrast" does not necessitate any particular conclusion regarding signal-to-noise ratio and control thereof. Indeed, when the statement is considered in the context of Yamada, one skilled in the art would clearly conclude that it relates to control of gain of the Yamada device.

Yamane, as understood by Applicants, is directed to an X-ray imaging apparatus purportedly capable of performing real-time imaging and operating at high speed. According to the Office Action, Yamane disclose use of selenium film having a thickness of 300 to 600  $\mu\text{m}$ .

Kramer, as understood by Applicants, is directed to an x-ray detector having a pixel array of hybrid semiconductor construction. According to the Office Action, Kramer discloses that digital x-ray imaging devices can be used for non-destructive testing of manufactured objects.

However, Applicants simply do not find a teaching or suggestion in the cited art of a digital imaging device which can operate appropriately for a wide range of applications, and has a signal-to-noise behavior which can be suitably controlled to attain an appropriate signal-to-noise ratio for a selected object being imaged with the device, as described in claim 1 as amended.

Since the cited art does not disclose or suggest each and every feature of the claimed invention, the cited art does not render the claimed invention unpatentable.

Independent claims 9 and 15 are patentably distinct from the cited art for at least similar

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reasons.

Accordingly, for at least the above-stated reasons, Applicants respectfully submit that independent claims 1, 9 and 15, and the claims depending therefrom, are patentable over the cited art.

The Office is hereby authorized to charge any fees that may be required in connection with this response and to credit any overpayment to our Deposit Account No. 03-3125.

If a petition for an additional extension of time is required to make this response timely, this paper should be considered to be such a petition, and the Commissioner is authorized to charge the requisite fees to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Allowance of this application is respectfully requested.

Respectfully submitted,

  
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